

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/760,741	01/17/2001	Jerry M. Brooks	M4065.0374/P374	5786

7590

01/09/2002

Thomas J. D'Amico
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L Street NW
Washington, DC 20037-1526

EXAMINER

CHU, CHRIS C

ART UNIT

PAPER NUMBER

2815

DATE MAILED: 01/09/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/760,741

Applicant(s)

BROOKS

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 November 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 4 - 22, 24 - 27, and 29 - 31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 4 - 22, 24 - 27, and 29 - 31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 01 November 2001 is: a) ☐ approved b) ☒ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. The amendment filed on November 01, 2001 has been received and entered in this office action.

Cancel claims: 2, 3, 23, and 28.

Amend claims: 1, 15, 22, 27, and 29.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: On page 21, line 9 of the amendment refers an adhesive fillet "24" which is not referenced in the figures. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect may be deferred until after the examiner has considered the proposed drawing correction. Failure to timely submit the proposed drawing correction will result in the abandonment of the application.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1, 4 ~ 7, and 10 ~ 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukui et al.

Note Fig. 1 of Fukui et al., where he/she shows a semiconductor assembly comprising: a support structure (5) having a top surface (see Fig. 1), wherein said support structure (5) is a film (see Fig. 2(a) and read column 7, lines 11 ~ 29); and at least one semiconductor die (1 and 2) having a top and bottom surface, said bottom surface having a smaller area than said top surface of said support structure (see Fig. 1), said at least one semiconductor die (1) being secured at its bottom surface to said top surface of said support structure (5) by a flowable adhesive material (6) which does not extend past a perimeter of said at least one semiconductor die (see Fig. 1).

Regarding claim 4, note Fig. 1 of Fukui et al., where he/she shows said support structure is at least one semiconductor die (1) with a top and bottom surface (see Fig. 1).

Regarding claims 5 and 19, Fukui et al. discloses said flowable adhesive material (6 in Fig. 1) is an epoxy (column 9, lines 15 ~ 17).

Regarding claim 6, note Figs. 11(a) ~ 11(g) of Fukui et al., where he/she shows said flowable adhesive material (24) covers an area less than or equal to about 90% of said at least one semiconductor die bottom surface area (see Fig. 11(b)).

Regarding claim 7, note Fig. 1 of Fukui et al., where he/she shows said flowable adhesive material (6) covers an area greater than or equal to about 50% of said at least one semiconductor die bottom surface area (see Fig. 1).

Regarding claim 10, note Fig. 1 of Fukui et al., where he/she shows said at least one semiconductor die (1) is in electrical communication with at least one electrical contact area provided on said support structure (see Fig. 1).

Regarding claim 11, note Fig. 1 of Fukui et al., where he/she shows said electrical communication is through a wire bond (7 in Fig. 1).

Regarding claim 12, note Fig. 1 of Fukui et al., where he/she shows said at least one electrical contact area is a bonding pad (see Fig. 1).

Regarding claim 13, note Fig. 1 of Fukui et al., where he/she shows further comprising an encapsulating material (8) for encapsulating said die, electrical communication, and at least a portion of said support structure (see Fig. 1).

Regarding claim 14, note Figs. 11(a) ~ 11(g) of Fukui et al., where he/she shows said encapsulating material fills (8) in at least some portion of a space between said bottom surface of said die (21) and said top surface of said support structure (see Fig. 11(g)).

6. Claims 22, 24, and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Hawke et al.

Note Fig. 5 of Hawke et al., where he/she shows a semiconductor assembly comprising: a first semiconductor die (216) having a top and a bottom surface (see Fig. 5); a support structure (202) to which said bottom surface of said first semiconductor die is secured (see Fig. 5), wherein said support structure (202) is a film (read column 5, lines 16 ~ 23); a second semiconductor die (218a) having a top and a bottom surface, said bottom surface having a smaller area than said top surface of said first semiconductor die (see Fig. 5); a third semiconductor die (218b) having a top and a bottom, said bottom surface having a smaller area than said top surface of said first semiconductor die (see Fig. 5), said second and third semiconductor dies being secured at their bottom surface to said top surface of said first semiconductor die by a flowable adhesive material which does not extend past the perimeter of said second semiconductor die or said third semiconductor die (see Fig. 5 and column 12, lines 32 ~ 39). Further, since the difference between Fig. 2 and Fig. 5 is location of chips on a substrate, not a substrate. Therefore, the substrate 202 is formed as same as the substrate 102.

Regarding claim 24, Hawke et al. discloses said flowable adhesive material is an epoxy (column 12, lines 32 ~ 33).

Regarding claim 26, Hawke et al. discloses said flowable adhesive material covers an area greater than or equal to about 50% of said second and said third semiconductor die's bottom surface area (read column 12, lines 32 ~ 39).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukui et al. in view of Ball.

Regarding claims 8 and 9, Fukui et al. discloses the claimed invention except for a distance between an electrical contact area and said perimeter of said at least one semiconductor die is less than or equal to about 200 microns. However, Ball shows that said top surface of a distance between an electrical contact area and said perimeter of said at least one semiconductor die is less than or equal to about 200 microns (see Fig. 2). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Fukui et al. by including a distance between an electrical contact area and said perimeter of said at least one semiconductor die is less than or equal to about 200 microns as taught by Ball. The ordinary artisan would have been motivated to modify Fukui et al. in the manner described above for at least the purpose of decreasing a size of the package.

9. Claims 15 ~ 19, 21, 27, and 29 ~ 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukui et al. in view of Lo et al.

Regarding claims 15 and 27, Fukui et al. discloses the claimed invention except for wherein said top surface of said first semiconductor die has at least one electrical contact area positioned at a location exterior to said perimeter of said second semiconductor die, and wherein a distance between said electrical contact area and said perimeter of said second semiconductor die is less than or equal to about 428 microns. However, Lo et al. discloses wherein said top surface of said first semiconductor die (12) has at least one electrical contact area (13) positioned at a location exterior to said perimeter of said second semiconductor die (11; see Fig. 1), and wherein a distance (A) between said electrical contact area and said perimeter of said second semiconductor die is less than or equal to about 428 microns (read column 2, lines 31 ~ 58). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Fukui et al. by including the distance and location of the electrical contact area as taught by Lo et al. The ordinary artisan would have been motivated to modify Fukui et al. in the manner described above for at least the purpose of preventing a capillary from colliding with the chip during the three-dimensional package wiring process (column 1, lines 62 ~ 64).

Regarding claim 16, note Fig. 1 of Fukui et al., where he/she shows said first semiconductor die (1) is secured to a support structure (see Fig. 1).

Regarding claim 17, note Fig. 1 of Fukui et al., where he/she shows said support structure (5) is a film (see Fig. 2(a)).

Regarding claims 18, since Fukui et al. does not limit the circuit board to any particular or specific device, the reference encompasses all well known circuit board's including "printed circuit board."

Regarding claim 19, Fukui et al. discloses said flowable adhesive material (6 in Fig. 1) is an epoxy (column 9, lines 15 ~ 17).

Regarding claim 21, note Fig. 1 of Fukui et al., where he/she shows said flowable adhesive material (6) covers an area greater than or equal to about 50% of said second semiconductor die's bottom surface area (see Fig. 1).

Regarding claim 29, Fukui et al., as modified, discloses a distance between an electrical contact area on said top surface of said first semiconductor die and said perimeter of said second semiconductor die is less than or equal to about 200 microns (read column 2, lines 31 ~ 58).

Regarding claim 30, note Fig. 1 of Fukui et al., where he/she shows at least one of said first and said second semiconductor dies (1 and 2) are in electrical communication with said support structure (see Fig. 1).

Regarding claim 31, note Fig. 7(b) of Fukui et al., where he/she shows said second semiconductor die (2) is in electrical communication with an electrical contact area (17a) on said first semiconductor die (see Fig. 7(b)).

10. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukui et al. in view of Lo et al. as applied to claim 15 above, and further in view of Ball.

Fukui et al., as modified, discloses the claimed invention except for said flowable adhesive material covers an area less than or equal to about 90% of said second semiconductor die's bottom surface area. However, Ball shows that said flowable adhesive material (22) covers an area less than or equal to about 90% of said second semiconductor die's bottom surface area (see Fig. 2). Thus, it would have been obvious to one of ordinary skill in the art at the time when

Art Unit: 2815

the invention was made to further modify Fukui et al. by including said flowable adhesive material covers an area less than or equal to about 90% of said second semiconductor die's bottom surface area as taught by Ball. The ordinary artisan would have been motivated to further modify Fukui et al. in the manner described above for at least the purpose of eliminating overflow of the adhesive agent between the first and second semiconductor chip.

11. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawke et al. in view of Ball.

Hawke et al. discloses the claimed invention except for said flowable adhesive material covers an area less than or equal to about 90% of said second semiconductor die's bottom surface area. However, Ball shows that said flowable adhesive material (22) covers an area less than or equal to about 90% of said second semiconductor die's bottom surface area (see Fig. 2). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Hawke et al. by including said flowable adhesive material covers an area less than or equal to about 90% of said second semiconductor die's bottom surface area as taught by Ball. The ordinary artisan would have been motivated to modify Hawke et al. in the manner described above for at least the purpose of increasing packaging density.

Response to Arguments

12. Applicant's arguments filed on November 01, 2001 have been fully considered but they are not persuasive.

In page 14, paragraph 3, applicant argues “Fukui et al. ... fails to teach or suggest ‘a support structure having a top surface, wherein said support structure is a film’ as recited in independent claim 1.” The argument is not persuasive because Fukui et al. discloses a support structure (5) having a top surface (see Fig. 1), wherein said support structure (5) is a film (see Fig. 2(a) and read column 7, lines 11 ~ 29).

Further, applicant argues “Fukui et al. ... fails to teach or suggest ... ‘said first semiconductor die has at least one electrical contact area positioned at a location exterior to said perimeter of said second semiconductor die, and wherein a distance between said electrical contact area and said perimeter of said second semiconductor die is less than or equal to about 428 microns’ as recited in independent claims 15 and 27.” In response to applicant's argument that the references fail to show above features of applicant's invention, it is noted that the features upon which applicant relies (i.e., said first semiconductor die has at least one electrical contact area positioned at a location exterior to said perimeter of said second semiconductor die, specifically, the underline feature) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In page 15, paragraph 2, applicant argues “Hawke et al. fails to teach or suggest ‘a support structure to which said bottom surface of said first semiconductor die is secured, wherein said support structure is a film’ as recited in claims 22 – 24 and 26.” The argument is not persuasive because Hawke et al. discloses a support structure (202) having a top surface (see Fig. 5), wherein said support structure (202) is a film (read column 5, lines 16 ~ 23). Further, since

the difference between Fig. 2 and Fig. 5 is location of chips on a substrate, not a substrate.

Therefore, the substrate 202 is formed as same as the substrate 102.

In page 16, paragraph 2, applicant argues "Ball and Fukui et al. fail to teach or suggest 'a distance ... is less than or equal to about 428 microns' as recited in claim 8 and 'a distance ... is less than or equal to about 200 microns' as recited in claim 9." And applicant further argues "Fukui et al. fails to disclose any distances, while Ball only discloses various thicknesses, such as, for example, the die thickness 54 (0.012 inches or 308 microns.)." The argument is not persuasive because reference number 56, which is a thickness between an electrical contact area and said perimeter of semiconductor die, is 0.008 inches or 205 microns. Since applicant recites 'about 200 microns' in claims 9 and does not provided any indication as to what range of specific activity is covered by the term "about", Fukui et al. in view of Ball clearly discloses the claim limitation.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

Art Unit: 2815

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

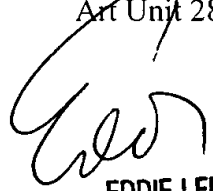
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
January 4, 2002


EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800